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Sueyoshi et al.

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(54) **BEAUTY APPARATUS**

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(58) **Field of Classification Search**
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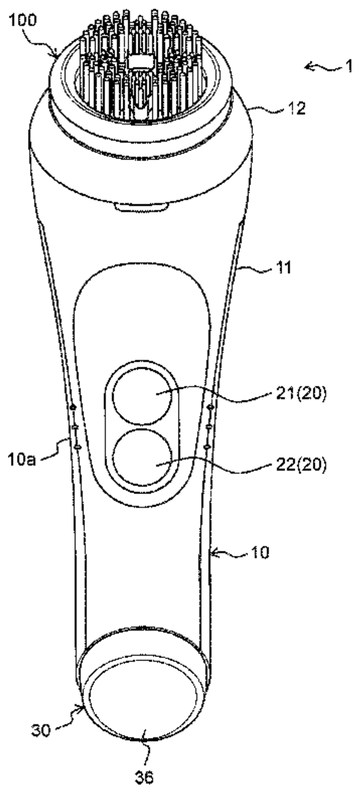
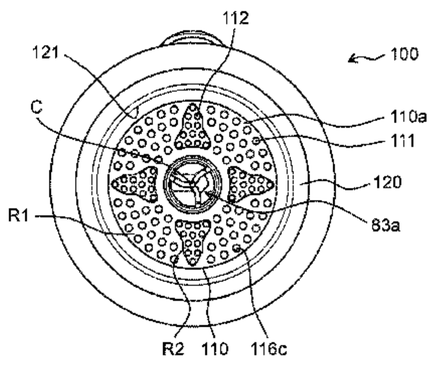
(57) **ABSTRACT**

A beauty apparatus according to the present disclosure includes a main body including a grip, and a brush part rotatably mounted to the main body. The brush part includes a first brush having a tuft of a plurality of bristles, and a second brush thicker than each of the plurality of bristles. A plurality of the second brushes disposed around a rotation center of the brush part is made greater in number than a plurality of the second brushes disposed along an outer circumference of the brush part. The beauty apparatus is capable of more uniform removal of dirt from skin.

8 Claims, 9 Drawing Sheets





(51) **Int. Cl.**

A46B 9/06	(2006.01)
A47K 7/04	(2006.01)
A61H 7/00	(2006.01)
A46B 13/02	(2006.01)
A46B 13/04	(2006.01)
A46B 13/00	(2006.01)

(52) **U.S. Cl.**
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(58) **Field of Classification Search**
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USPC ..... 15/28, 29, 180, DIG. 5, DIG. 6; 601/15, 601/17, 112, 114
See application file for complete search history.

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FIG. 1

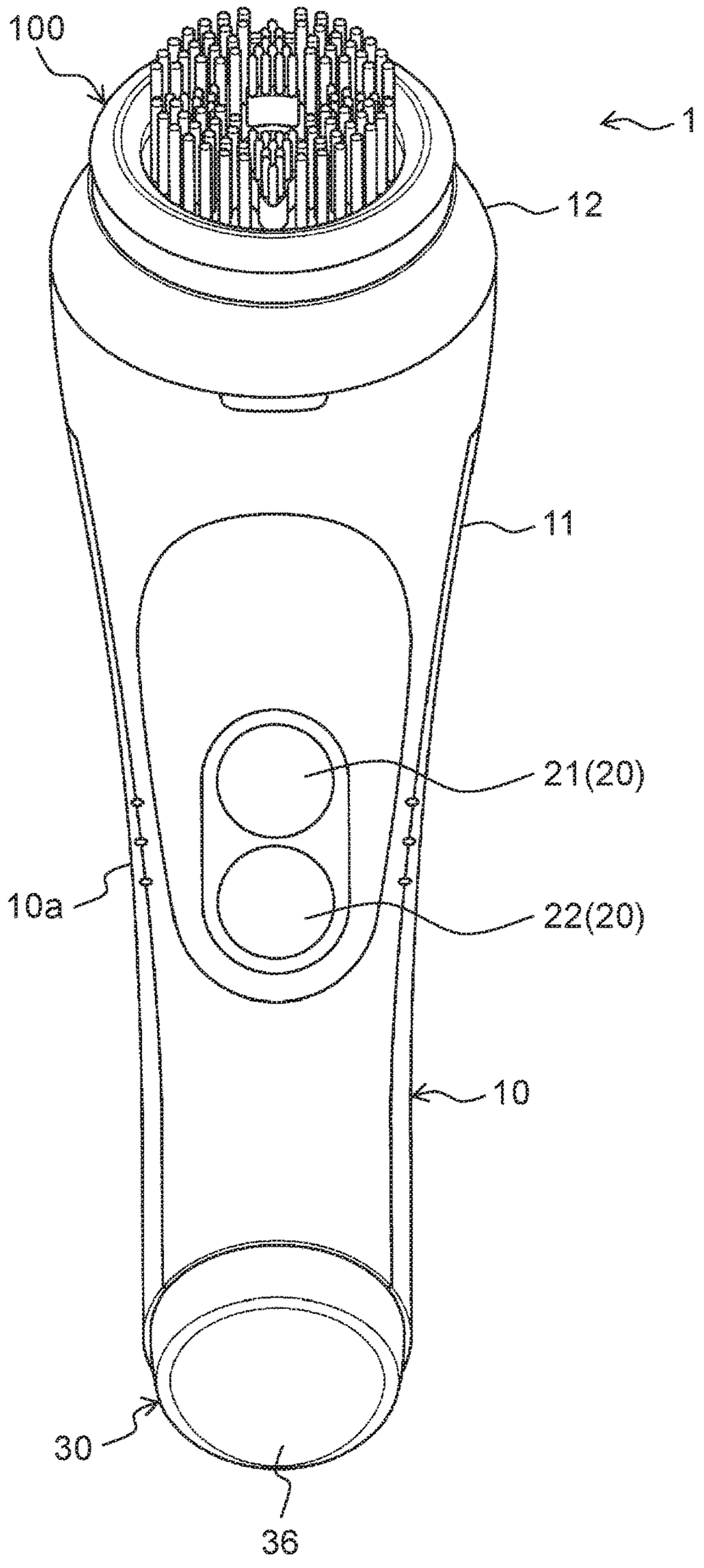


FIG. 2

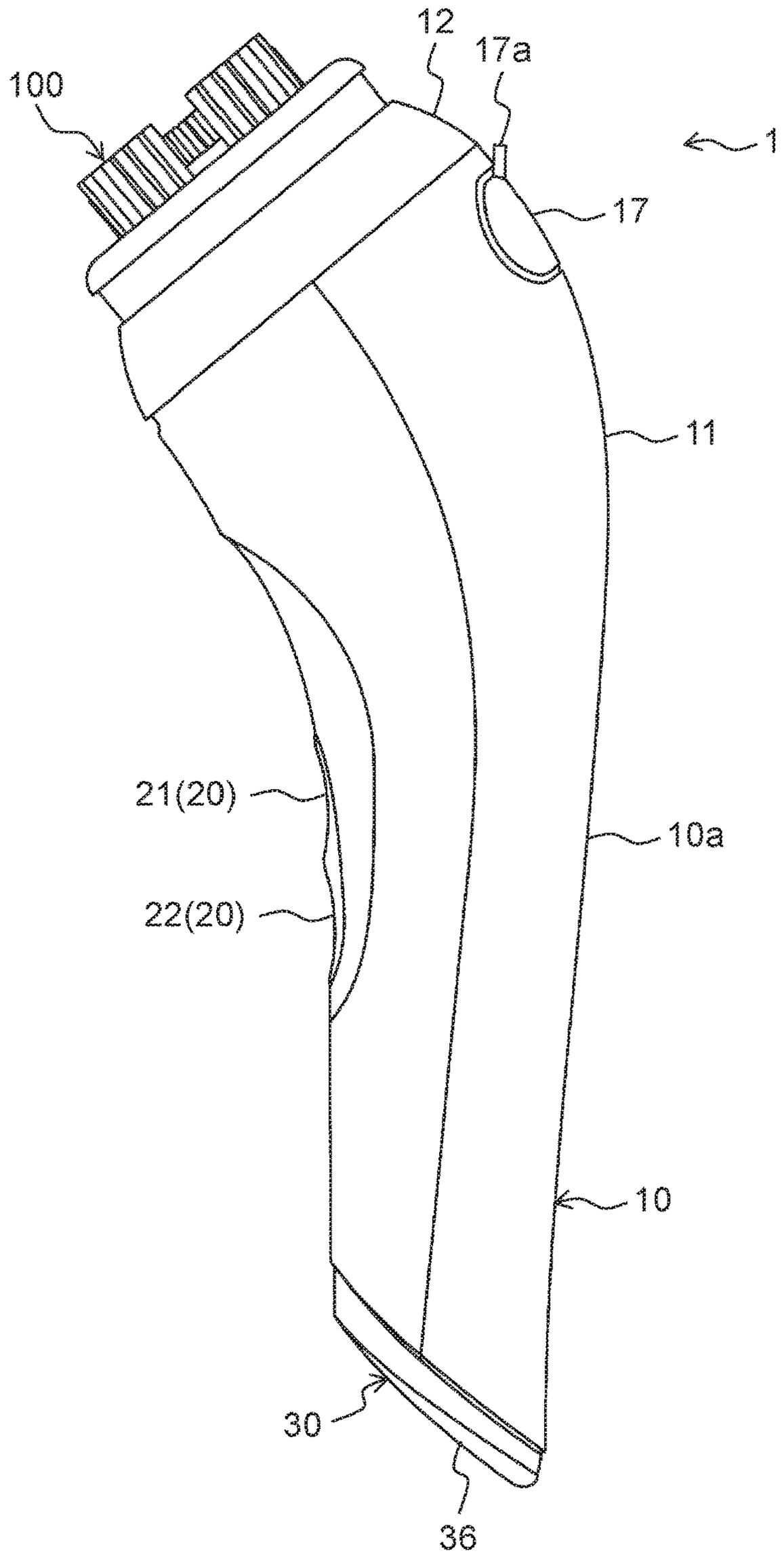


FIG. 3

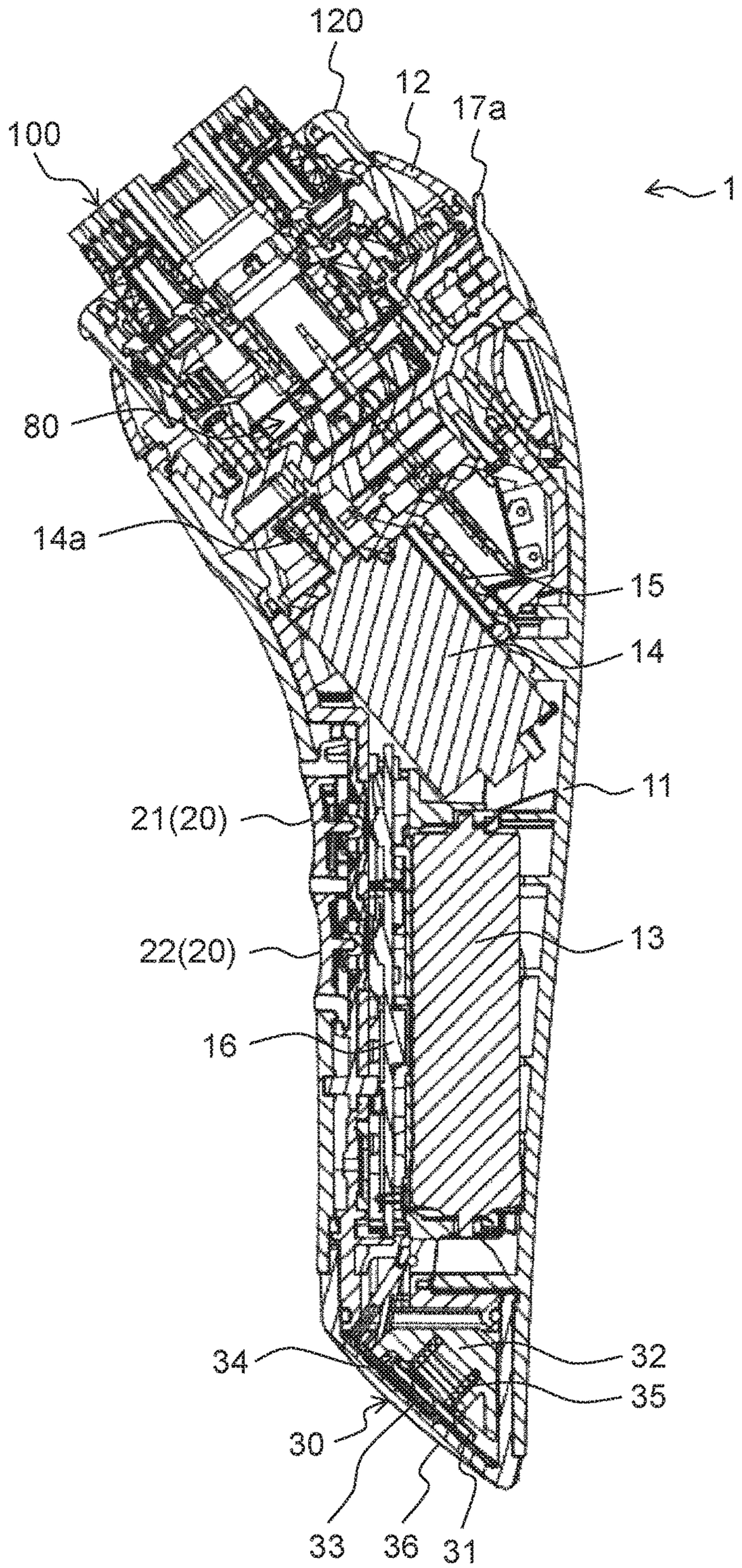
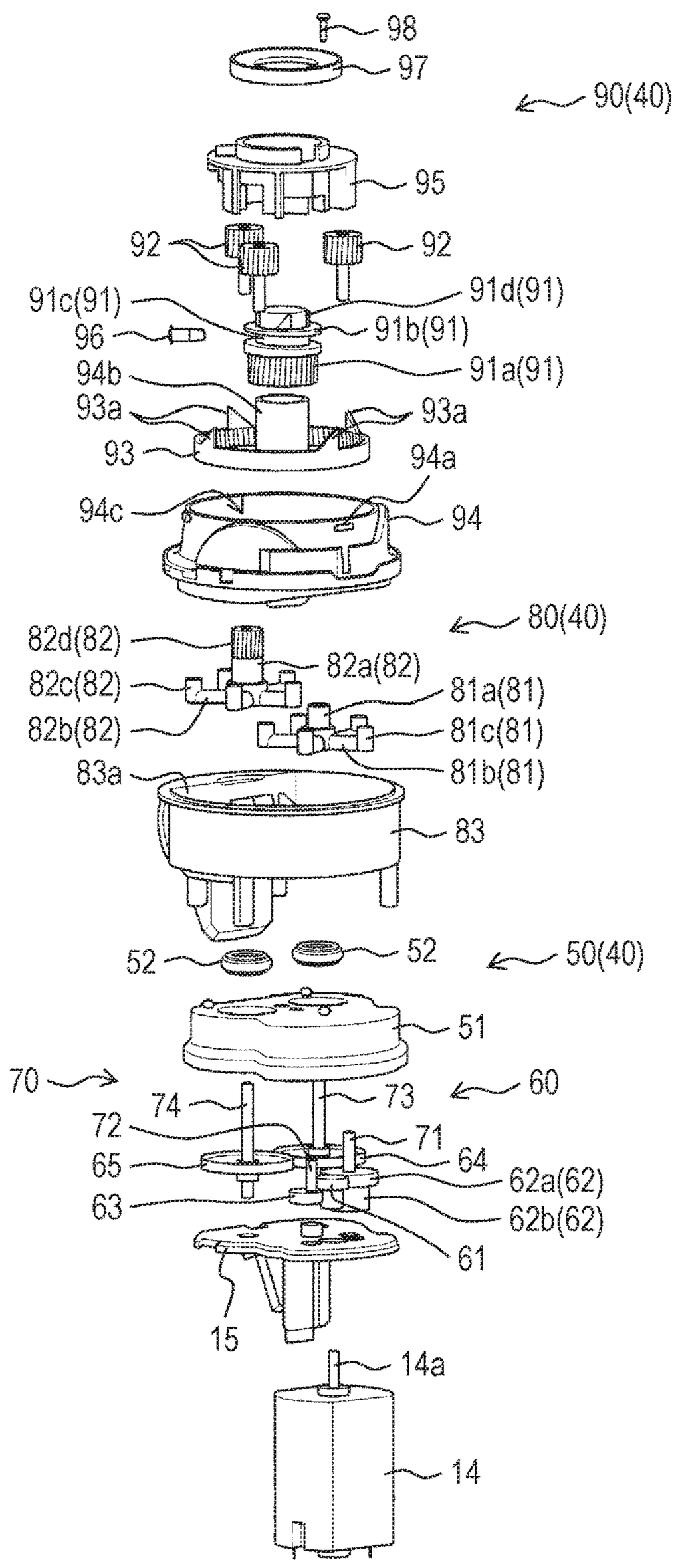


FIG. 4


98
97
90(40)
95
92
92
91c(91)
91d(91)
96
91b(91)
91a(91)
94b
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93a
93
94a
94c
94
80(40)
82d(82)
82a(82)
82c(82)
81a(81)
82b(82)
81c(81)
81b(81)
83a
83
52
52
50(40)
51
70
74
73
60
72
71
65
64
62a(62)
63
62b(62)
61
15
14a
14

FIG. 5

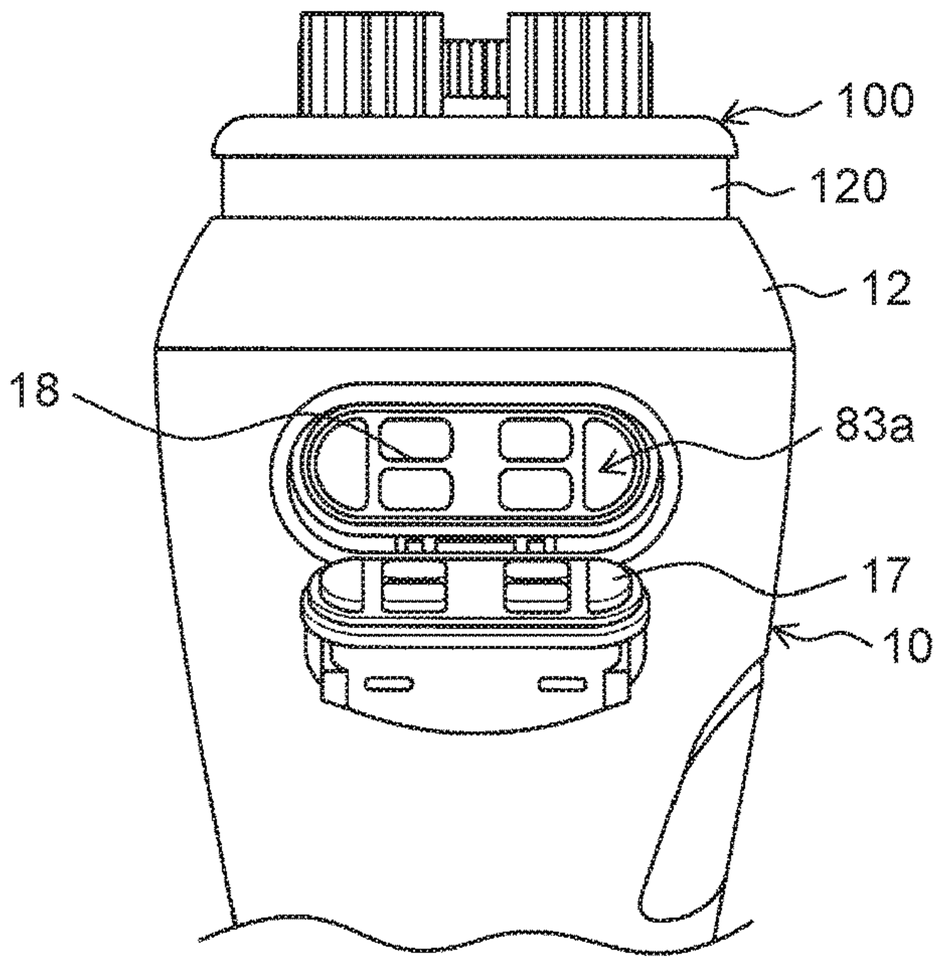
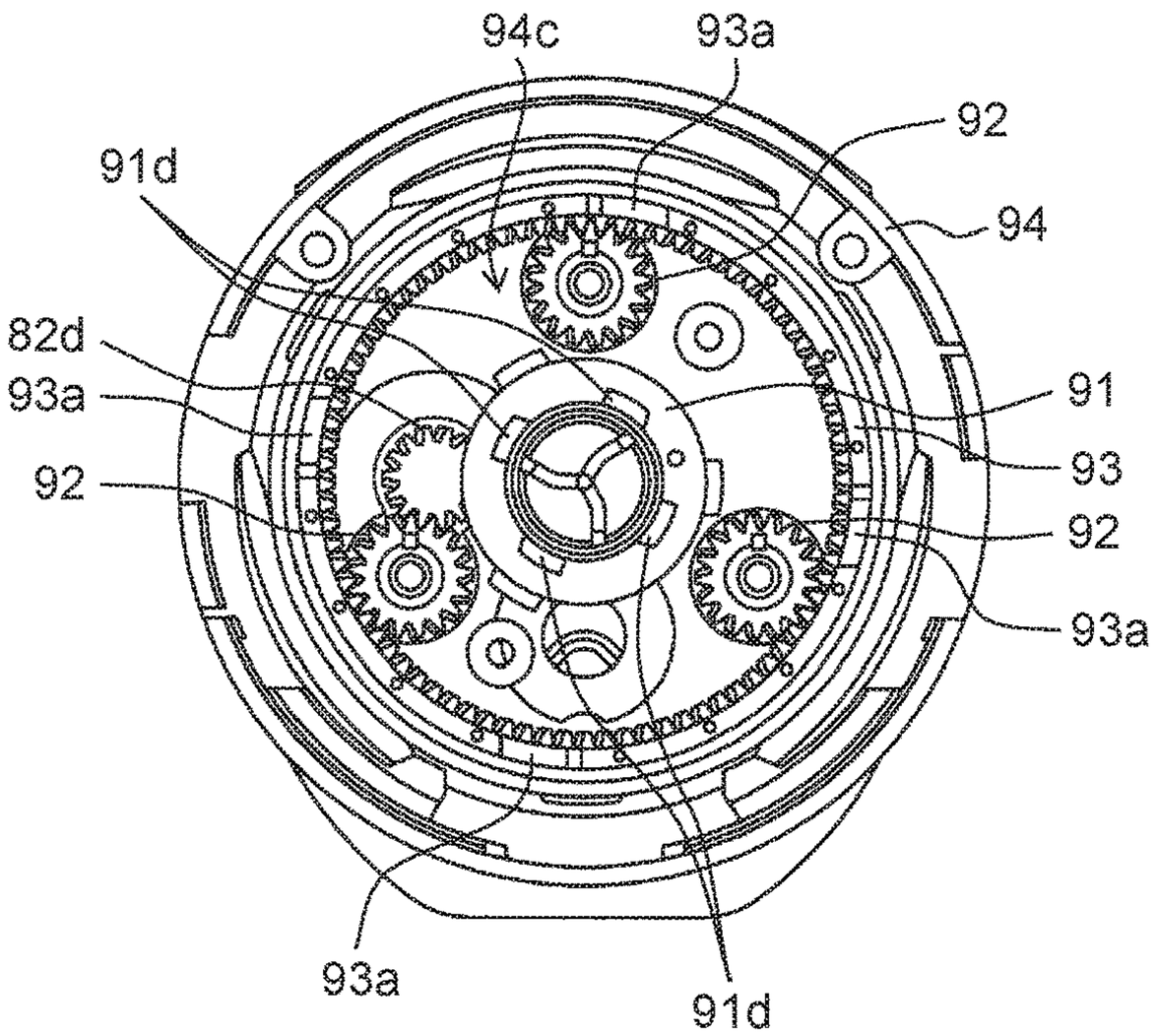

100
120
12
18
83a
17
10

FIG. 6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93a
92
91d
94
82d
93a
92
91
93
92
93a
93a
91d

FIG. 7

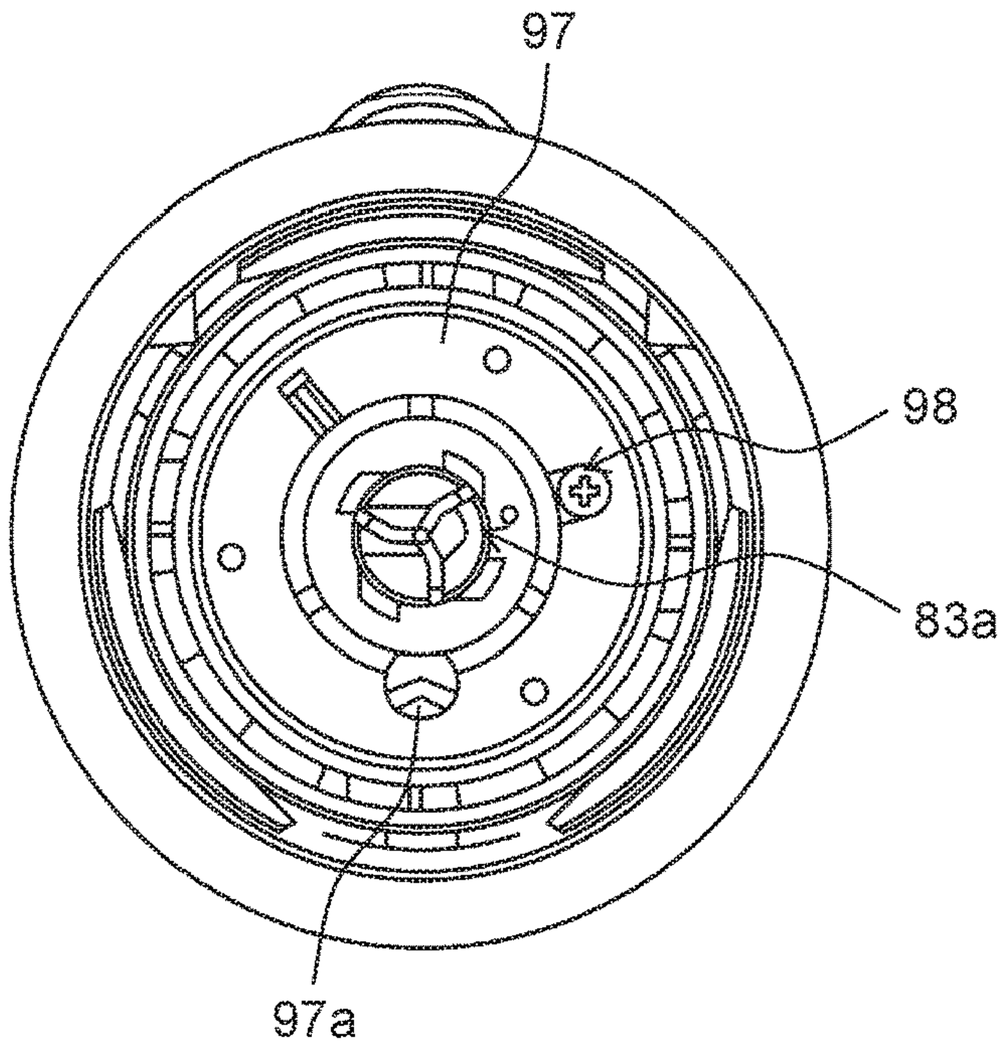


FIG. 8

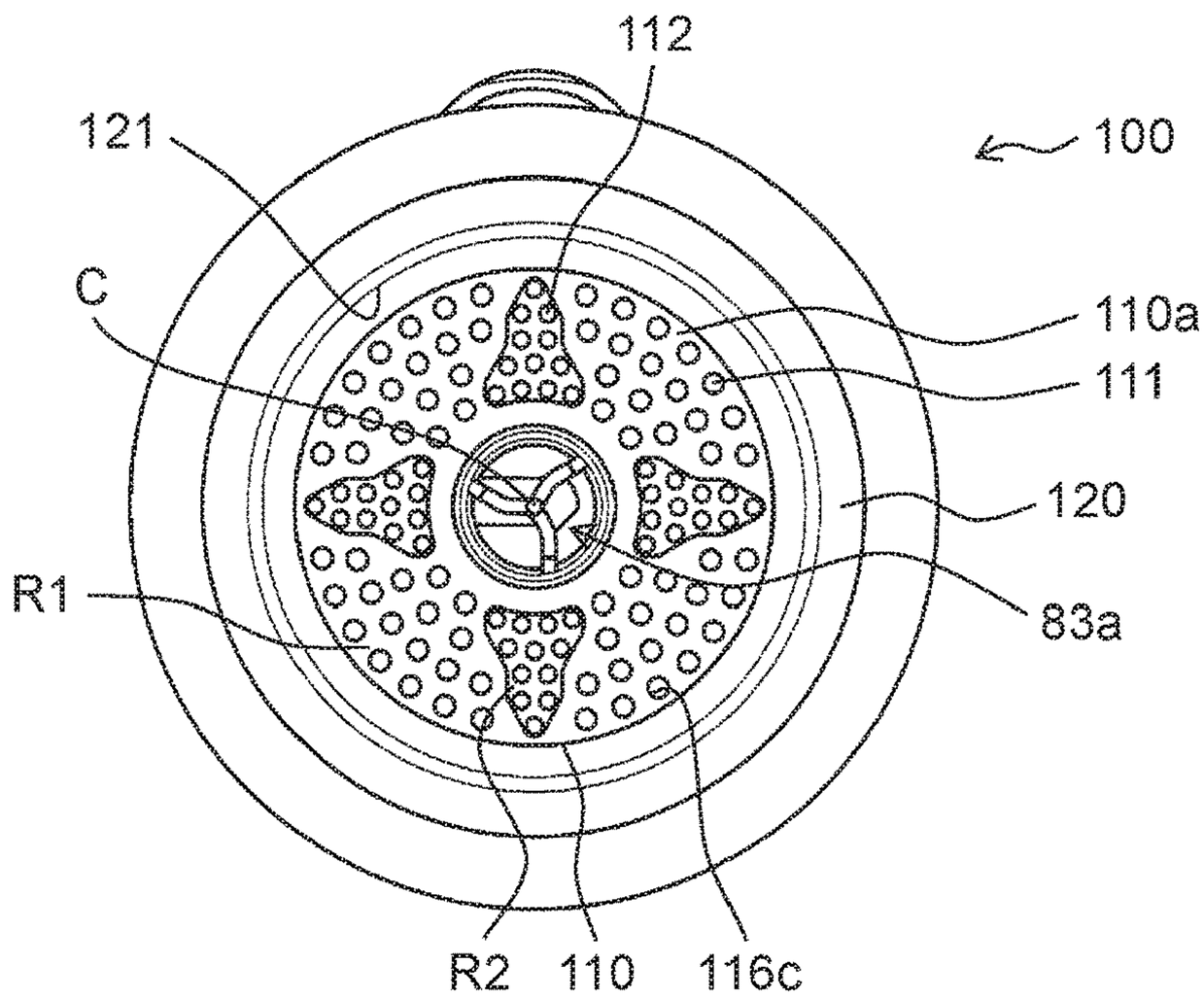


FIG. 9

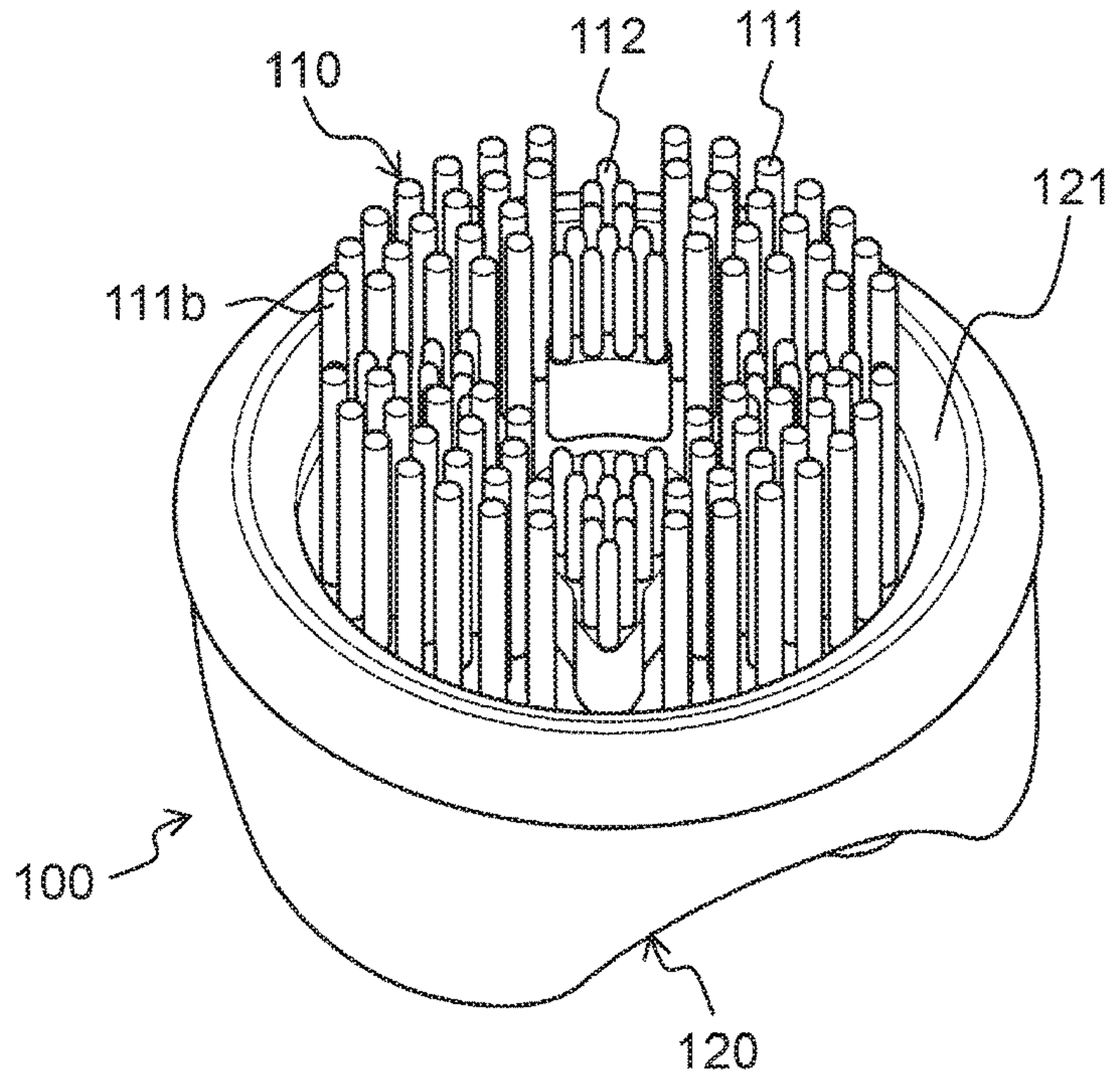
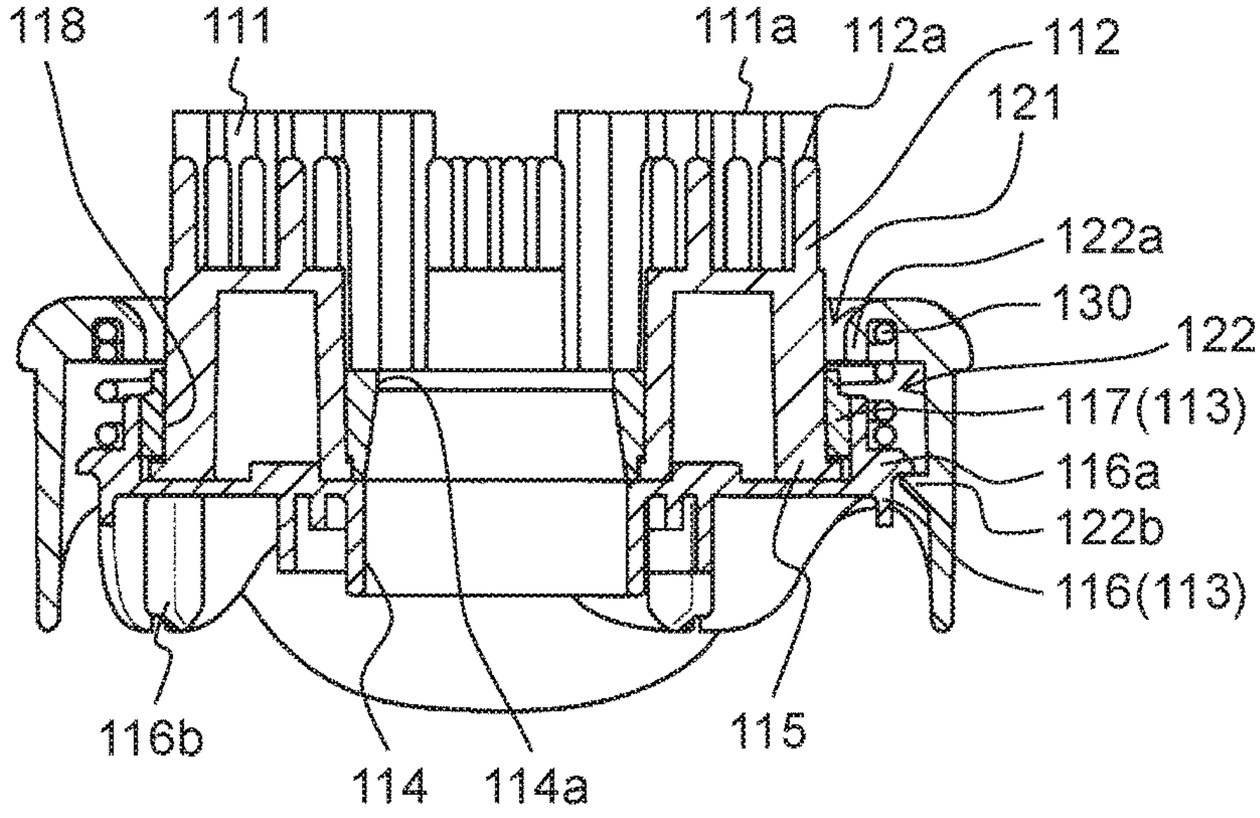

110
112
111
121
111b
100
120

FIG. 10


118
111
111a
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121
122a
130
122
117(113)
116a
122b
116(113)
116b
114
114a
115

FIG. 11

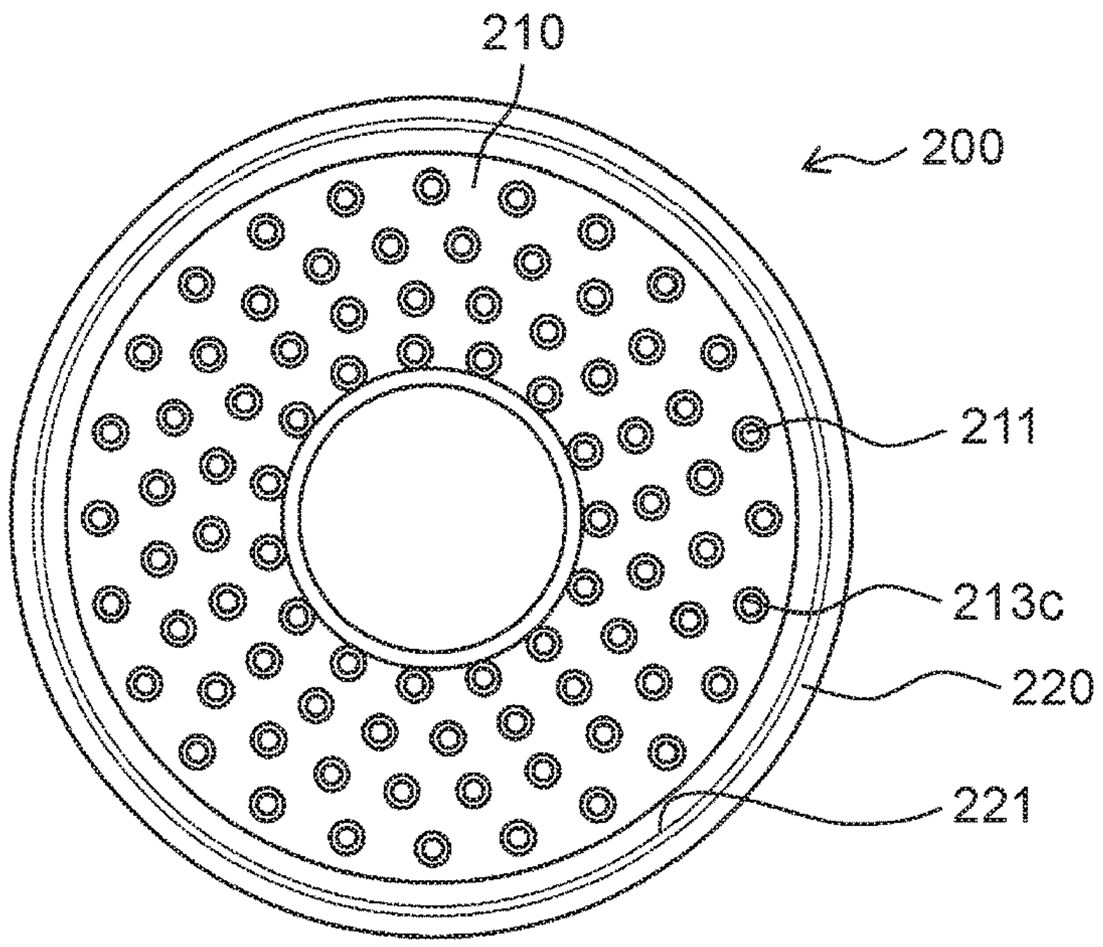


FIG. 12

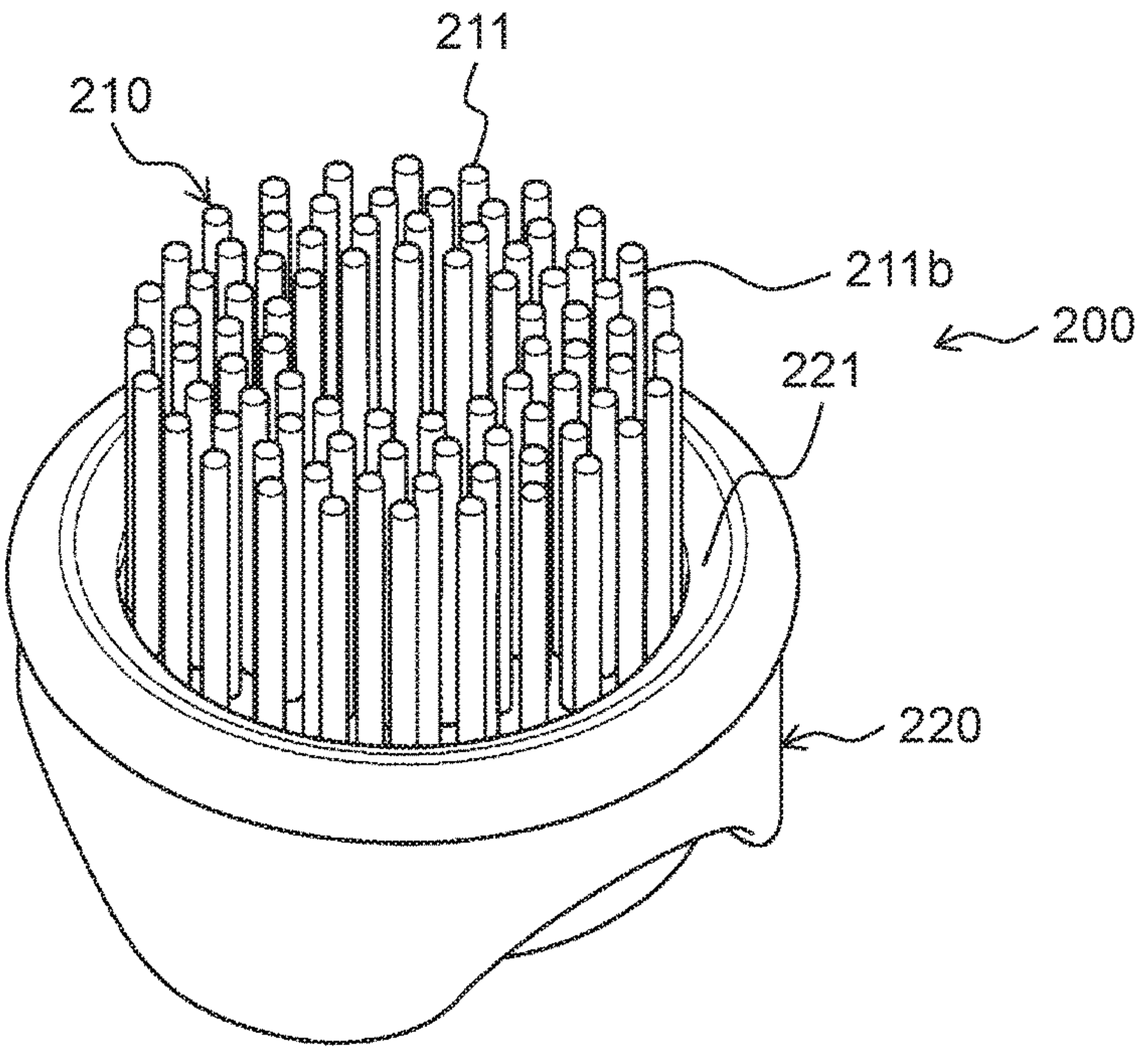
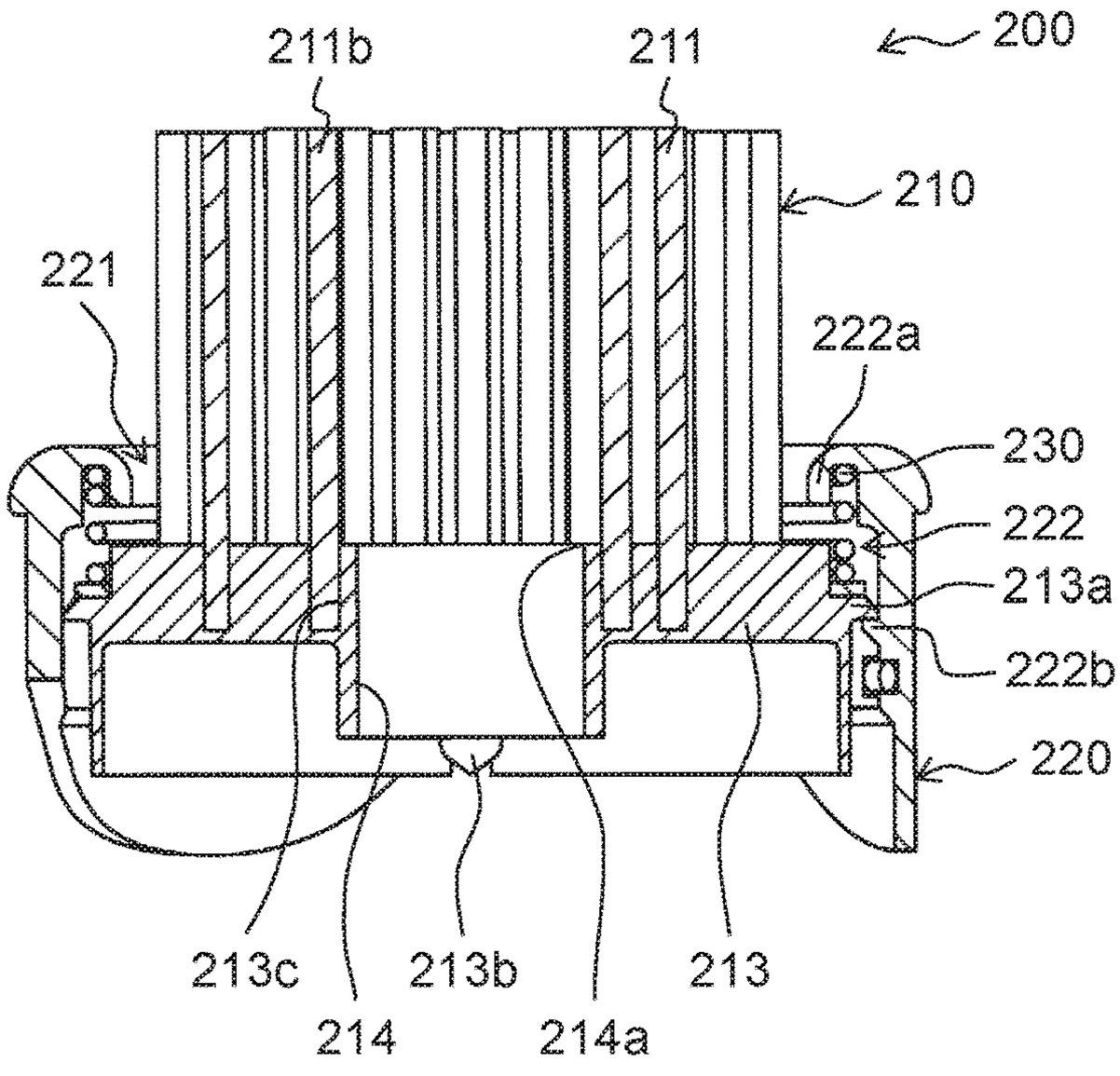


FIG. 13


211b
211
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221
222a
230
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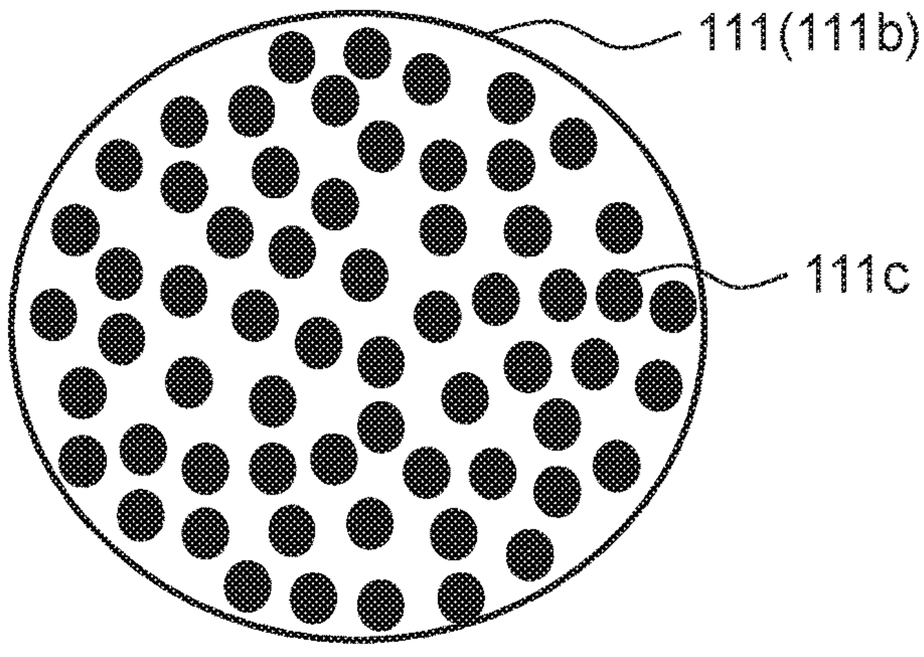
213a
222b
220
213c
213b
213
214
214a

FIG. 14


111(111b)
111c

BEAUTY APPARATUS

BACKGROUND

1. Technical Field

The present disclosure relates to a beauty apparatus.

2. Description of the Related Art

A conventional beauty apparatus is proposed by, for example, Japanese Translation of PCT Publication No. 2015-524728. The proposed beauty apparatus includes a main body and a brush part rotatably mounted to one end of the main body, and the brush part is formed with brushes of a plurality of types.

In the above conventional technique, however, the brushes of each of the types are disposed to be greater in number along an outer circumference of the brush part than around a rotation center of the brush part. In other words, the brushes of the same type are disposed so as to be greater in number along the outer circumference where peripheral velocity is relatively high than they are around the rotation center where the peripheral velocity is relatively low.

For this reason, in cases where, for example, brushes having relatively high cleaning power are arranged as described above and a brush part is rotated with the brushes abutted on a skin surface for skin cleaning, skin cleaning power may differ between a rotation center side and an outer circumference side of the brush part.

SUMMARY

To solve the above conventional problem, the present disclosure aims to provide a beauty apparatus capable of more uniform removal of dirt from skin.

To achieve the above object, a beauty apparatus according to the present disclosure includes a main body including a grip, and a brush part rotatably mounted to the main body.

The brush part includes a first brush having a tuft of a plurality of bristles, and a second brush thicker than each of the plurality of bristles.

A plurality of the second brushes disposed around a rotation center of the brush part is made greater in number than a plurality of the second brushes disposed along an outer circumference of the brush part.

Accordingly, difference in skin cleaning power is reduced between a rotation center side and an outer circumference side of the brush part when the brush part is rotated with the brushes abutted on a skin surface for skin cleaning, thereby enabling more uniform removal of dirt from skin.

According to the present disclosure, the beauty apparatus obtained is capable of the more uniform removal of the dirt from the skin.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a front view of a beauty apparatus according to an exemplary embodiment of the present disclosure;

FIG. **2** is a side view of the beauty apparatus according to the exemplary embodiment of the present disclosure;

FIG. **3** is a sectional view of the beauty apparatus according to the exemplary embodiment of the present disclosure;

FIG. **4** is an exploded perspective view illustrating a drive source and a drive mechanism of the beauty apparatus according to the exemplary embodiment of the present disclosure;

FIG. **5** is an enlarged rear view illustrating the beauty apparatus with its lid being open according to the exemplary embodiment of the present disclosure;

FIG. **6** is a plan view illustrating a part of the drive mechanism of the beauty apparatus according to the exemplary embodiment of the present disclosure;

FIG. **7** is a plan view illustrating the drive mechanism of the beauty apparatus according to the exemplary embodiment of the present disclosure;

FIG. **8** illustrates a head of the beauty apparatus according to the exemplary embodiment of the present disclosure, as viewed along an axis of rotation;

FIG. **9** is a perspective view of the head of the beauty apparatus according to the exemplary embodiment of the present disclosure;

FIG. **10** is a sectional view of the head of the beauty apparatus according to the exemplary embodiment of the present disclosure;

FIG. **11** illustrates another head viewed along an axis of rotation when the beauty apparatus according to the exemplary embodiment of the present disclosure is used as a part of a beauty apparatus set;

FIG. **12** is a perspective view of the other head when the beauty apparatus according to the exemplary embodiment of the present disclosure is used as the part of the beauty apparatus set;

FIG. **13** is a sectional view of the other head when the beauty apparatus according to the exemplary embodiment of the present disclosure is used as the part of the beauty apparatus set; and

FIG. **14** is a plan view of a first brush according to the exemplary embodiment of the present disclosure.

DETAILED DESCRIPTION

A beauty apparatus according to an exemplary embodiment of the present disclosure includes a main body including a grip, and a brush part rotatably mounted to the main body.

The brush part includes a first brush having a tuft of a plurality of bristles, and a second brush thicker than each of the plurality of bristles.

A plurality of the second brushes disposed around a rotation center of the brush part is made greater in number than a plurality of the second brushes disposed along an outer circumference of the brush part.

Accordingly, difference in skin cleaning power is reduced between a rotation center side and an outer circumference side of the brush part when the brush part is rotated with the brushes abutted on a skin surface for skin cleaning, thereby enabling more uniform removal of dirt from skin.

With the thick second brush abutted on the skin surface while being rotated, dead skin cells that are hard to remove with normal brushes can be removed, while the dirt can be removed from the skin surface by the brush having the thinner bristles. Here, the dead skin cells can be removed more efficiently even near the rotation center where peripheral velocity is low, so that the dirt can be removed more uniformly from the skin.

The pluralities of the second brushes are disposed on respective concentric circles having a center of the concentric circles at the rotation center of the brush part.

When a comparison is made of numbers of the pluralities of the second brushes disposed on radially adjacent concentric circles among the concentric circles, the number of the plurality of the second brushes disposed on the concentric circle closer to the rotation center of the brush part is not less than the number of the plurality of the second brushes disposed on the outer concentric circle.

Accordingly, the difference in skin cleaning power can be reduced further between the rotation center side and the outer circumference side of the brush part, thereby enabling more uniform removal of the dirt from the skin.

Each of the second brushes is higher in hardness than the first brush.

This enables more reliable removal of the dead skin cells that are hard to remove with the normal brushes.

Each of the second brushes is made of silicon.

The second brush made of silicon can thus remove the dead skin cells adhering to the skin surface by rubbing the skin with reduced skin irritation.

A leading end of the first brush projects further than a leading end of each of the second brushes.

In this way, the second brush is prevented from abutting strongly on the skin, thereby reducing skin irritation.

When viewed along a rotation center axis, the brush part is divided into a region where the first brush is disposed and a region where the second brush is disposed.

With the second brush disposed in the predetermined region, skin cleaning power can be increased as compared with cases where the second brushes are disposed dispersively.

A plurality of the regions where a plurality of the second brushes is disposed is formed circumferentially.

Accordingly, when the brush part is rotated with the brushes abutted on the skin surface for skin cleaning, the first brushes and the second brushes alternate in cleaning the skin, whereby the skin cleaning power can be increased further with reduced skin irritation.

An area of the region where the second brush is disposed is not more than a half of an area of the region where the first brush is disposed.

With the area of the region where the second brush is disposed being not more than the half of the area of the region where the first brush is disposed, more reliable reduction of the skin irritation can be achieved.

The brush part is formed with a hole enabling passage of a cleanser.

The cleanser such as present inside the main body can thus be fed to the first brush and the second brush during skin cleaning, thereby increasing the skin cleaning power further.

Exemplary Embodiment

Beauty apparatus **1** according to the exemplary embodiment is a handheld beauty apparatus used mainly for facial cleaning. As shown in FIG. **1**, beauty apparatus **1** includes main body **10** formed with grip **10***a*, and head **100** detachably mounted to main body **10**.

Head **100** expedites removal of dirt from a target part to be cleaned (such as facial skin) through rubbing of the target part with first brushes **111** and second brushes **112** that are fed with foam (cleanser).

Main body **10** includes housing **11** that accommodates various components including drive source **14** (refer to FIG. **3**), cap **12** mounted to a top portion of housing **11**, operation part **20** that is operated for driving beauty apparatus **1**, and warming mechanism **30** for outputting heat. In the present exemplary embodiment, warming mechanism **30** is disposed at a bottom of housing **11**. It is to be noted that warming mechanism **30** can be omitted.

Housing **11** has a waterproof structure, and grip **10***a* is provided at a middle of housing **11**. In the present exemplary embodiment, as shown in FIG. **2**, housing **11** is such that a top portion (mounted with head **100**) of housing **11** is bent with respect to a grip portion (grip **10***a*) of housing **11**. By being bent with respect to the grip portion of housing **11**, the top portion of housing **11** facilitates abutment of head **100** on skin when a user holds the grip portion of housing **11**.

Housing **11** is formed with, in its back surface, inlet **18** (refer to FIG. **5**) from which a foaming agent (the cleanser) is poured into housing **11**. Examples of the foaming agent used for beauty apparatus **1** include a foaming agent in gel form and a foaming agent in liquid form.

Main body **10** further includes lid **17** for closing inlet **18**, and lid **17** is rotatably mounted to housing **11**. As lug **17***a* formed on lid **17** is pulled to cause rotation of lid **17**, inlet **18** is opened. It is to be noted that lid **17** may be detachably provided to housing **11** so that inlet **18** is opened by detachment of lid **17** from housing **11**.

Operation part **20** can be formed of, for example, buttons. In the present exemplary embodiment, operation part **20** includes first operation unit **21** for switching drive source **14** between on and off, and second operation unit **22** for switching warming mechanism **30** between on and off. In other words, when operated, first operation unit **21** outputs an ON signal that is an operation signal for changing drive source **14** from OFF to ON or an OFF signal that is an operation signal for changing drive source **14** from ON to OFF. On the other hands, second operation unit **22** outputs, when operated, an ON signal that is an operation signal for changing warming mechanism **30** from OFF to ON or an OFF signal that is an operation signal for changing warming mechanism **30** from ON to OFF.

Main body **10** further includes power supply **13** for supplying power of a primary battery or a secondary battery to electric blocks, drive source **14** that is driven by the power supplied from power supply **13**, base mount **15** holding drive source **14**, and drive mechanism **40** formed of a plurality of machine elements. These components (power supply **13**, drive source **14**, base mount **15**, and drive mechanism **40**) are accommodated by housing **11**.

As an example of drive source **14**, a motor can be used. In the present exemplary embodiment, output shaft **14***a* of drive source **14** is connected to a part of drive mechanism **40**.

Main body **10** further includes controller **16** for controlling drive source **14** and warming mechanism **30**. This controller **16** controls drive source **14** and warming mechanism **30** based on the operation signals output from first operation unit **21** and second operation unit **22**, respectively. In the present exemplary embodiment, with either drive source **14** or warming mechanism **30** being driven, controller **16** inhibits driving of the other. With either drive source **14** or warming mechanism **30** being driven, such inhibition can be effected by, for example, setting a flag that inhibits the driving of the other.

Warming mechanism **30** includes warming surface **36** formed at the bottom of housing **11**, heater **31** that is driven by the power supplied from power supply **13**, base mount **32** holding heater **31**, and heat transfer plate **33** for transmitting heat of heater **31** to warming surface **36**. Warming mechanism **30** further includes thermistor **34** for controlling temperature of heater **31**, and spring **35** that applies force to heater **31** for pressing heater **31** against heat transfer plate **33**.

As shown in FIG. **4**, drive mechanism **40** includes foam generating mechanism **80** that generates foam (from the cleanser) and feeds the foam to head **100** (refer to FIG. **1**), first transmission block **50** that transmits driving force of drive source **14** to foam generating mechanism **80**, and second transmission block **90** that transmits the driving force of drive source **14** to head **100**.

Foam generating mechanism **80** includes first rotor **81** and second rotor **82** that generate foam by stirring the foaming agent, water and air together, and container **83** having space **83***a* for storage of the foaming agent and the water. In the present exemplary embodiment, first rotor **81** and second rotor **82** are disposed within space **83***a* of container **83** and rotate in opposite directions. It is to be noted that as shown in FIG. **5**, space **83***a* of container **83** communicates with inlet **18** of main body **10**.

First transmission block **50** includes, as shown in FIG. **4**, gear group **60** composed of a plurality of gears, support shaft group **70** composed of a plurality of shafts for supporting gear group **60**, gear case **51** accommodating gear group **60**, and two packings **52** that prevent, for example, the liquid from flowing into gear case **51**. It is to be noted that gear case **51** is connected to base mount **15** in the present exemplary embodiment.

Gear group **60** specifically includes rotation driving gear **61**, compound gear **62**, rotation changing gear **63**, first rotation transmitting gear **64**, and second rotation transmitting gear **65**. Compound gear **62** includes two gears of different diameters, that is to say, first compound gear **62***a* and second compound gear **62***b*.

Support shaft group **70** specifically includes first support shaft **71** connecting with compound gear **62**, second support shaft **72** connecting with rotation changing gear **63**, third support shaft **73** connecting with first rotation transmitting gear **64**, and fourth support shaft **74** connecting with second rotation transmitting gear **65**.

Packings **52** are mounted to respective holes in gear case **51** that are intended for respective passages of third support shaft **73** and fourth support shaft **74**. By being mounted to the respective holes in gear case **51**, packings **52** can prevent, for example, the liquid from flowing into gear case **51** from container **83**.

In the present exemplary embodiment, output shaft **14***a* of drive source **14** supports rotation driving gear **61**, so that output shaft **14***a* and rotation driving gear **61** rotate integrally. Rotation driving gear **61** meshes with first compound gear **62***a*, and first compound gear **62***a* meshes with first rotation transmitting gear **64**. Accordingly, first rotation transmitting gear **64** and third support shaft **73** rotate integrally. Third support shaft **73** supports first rotor **81**, so that third support shaft **73** and first rotor **81** rotate integrally.

As output shaft **14***a* rotates, rotation of output shaft **14***a* is thus transmitted through rotation driving gear **61**, first compound gear **62***a*, first rotation transmitting gear **64**, and first rotor **81** in this order. Here, the rotation of output shaft **14***a* that is transmitted to first rotor **81** is decelerated by gears **61**, **62***a*, **64**.

First compound gear **62***a* meshing with rotation driving gear **61** rotates integrally with second compound gear **62***b*. Second compound gear **62***b* meshes with rotation changing gear **63**, and rotation changing gear **63** meshes with second rotation transmitting gear **65**. Accordingly, second rotation transmitting gear **65** and fourth support shaft **74** rotate integrally. Fourth support shaft **74** supports second rotor **82**, so that fourth support shaft **74** and second rotor **82** rotate integrally.

As output shaft **14***a* rotates, the rotation of output shaft **14***a* is thus transmitted through rotation driving gear **61**, first compound gear **62***a*, second compound gear **62***b*, rotation changing gear **63**, second rotation transmitting gear **65**, and second rotor **82** in this order. Here, the rotation of output shaft **14***a* that is transmitted to second rotor **82** is decelerated by gears **61**, **62***a*, **62***b*, **63**, **65**.

First rotor **81** includes base part **81***a* connected to third support shaft **73**, a plurality of arms **81***b* extending from base part **81***a* in a substantially radial manner, and pillars **81***c* projecting upward from respective leading ends of arms **81***b*. In the present exemplary embodiment, respective roots of the plurality of arms **81***b* are equi-spaced around base part **81***a*. Arms **81***b* and pillars **81***c* contribute to expedited stirring of the foaming agent and the others.

Second rotor **82** includes base part **82***a* connected to fourth support shaft **74**, a plurality of arms **82***b* extending from base part **82***a* in a substantially radial manner, pillars **82***c* projecting upward from respective leading ends of arms **82***b*, and rotation transmitting gear **82***d* connected to base part **82***a*. In the present exemplary embodiment, respective roots of the plurality of arms **82***b* are equi-spaced around base part **82***a*. Similarly to arms **81***b* and pillars **81***c*, arms **82***b* and pillars **82***c* contribute to the expedited stirring of the foaming agent and the others.

Gear group **60** forms two power transmission paths in the present exemplary embodiment, that is to say, a first power transmission path for transmitting the rotation of output shaft **14***a* to first rotor **81** and a second power transmission path for transmitting the rotation of output shaft **14***a* to second rotor **82**.

In the present exemplary embodiment, rotation transmitting gear **82***d* meshes with a part of second transmission block **90**.

Second transmission block **90** includes cam gear **91** and ring gear **93**. Cam gear **91** and ring gear **93** are a first transmission mechanism and a second transmission mechanism, respectively and are each capable of transmitting torque to brush part **110** (described later) of head **100**.

This second transmission block **90** further includes a plurality of planetary gears **92** meshing with ring gear **93**, head mount **94** to which head case **120** of head **100** is detachably mounted, and bearing **94***b* supporting cam gear **91**.

Head mount **94** includes a plurality of projections **94***a* for engagement in respective recesses (not shown) formed in head case **120** (described later) of head **100**, and accommodating space **94***c* accommodating, for example, gears **91**, **92**, **93**. Disposed within accommodating space **94***c*, bearing **94***b* is fixed to head mount **94**. Cam gear **91** is rotatably supported to bearing **94**. It is to be noted that cam gear **91** and bearing **94***b* are hollow elements, so that spaces within these respective elements communicate with space **83***a* of container **83**.

Second transmission block **90** further includes gear cover **95** covering gears **91**, **92**, **93**, pin **96** inserted into a hole (not shown) in gear cover **95**, and ring **97** disposed on a top surface of gear cover **95**. Gear cover **95** and ring **97** are fixed to head mount **94** by screw **98**. Ring **97** has a function of preventing, for example, the liquid from flowing into gear cover **95** and a function of preventing pin **96** from coming out in a radial direction of cam gear **91**. In addition, as shown in FIG. **7**, ring **97** is formed with hole **97***a* communicating with space **83***a* through gear cover **95**.

Cam gear **91** includes gear part **91***a* meshing with rotation transmitting gear **82***d*, cam part **91***b* that converts rotation of gear part **91***a* into vertical motion relative to head mount **94**, and a plurality of hooks **91***d* capable of transmitting the rotation of gear part **91***a* to brush part **110** of head **100**. Cam part **91***b* is formed with spiral groove **91***c* on its outer circumference.

As shown in FIG. **6**, rotation transmitting gear **82***d* meshes with gear part **91***a* of cam gear **91** and one of

planetary gears **92**. In the present exemplary embodiment, planetary gears **92** are equi-spaced around cam gear **91** and mesh with ring gear **93**.

Ring gear **93** is disposed within accommodating space **94***c* of head mount **94** and is rotatably supported by head mount **94**. As shown in FIG. **4**, ring gear **93** is formed with a plurality of hooks **93***a* that is capable of transmitting rotation of ring gear **93** to brush part **110** of head **100**. It is to be noted that in the present exemplary embodiment, rotational speed of ring gear **93** is set lower than rotational speed of cam gear **91**. For this reason, speed at which head **100** is operated (rotated) by ring gear **93** is lower than speed at which head **100** is operated (rotated) by cam gear **91**.

Gear cover **95** is mounted to head mount **94**, thereby closing an opening of head mount **94**. With gear cover **95** being mounted to head mount **94**, cam gear **91**, planetary gears **92**, and ring gear **93** are covered by gear cover **95**.

Pin **96** is inserted into the hole formed in gear cover **95** from an outer periphery of gear cover **95** to have its leading end inserted in groove **91***c* of cam gear **91**. By being inserted in groove **91***c* of cam gear **91** in this way, the leading end of pin **96** slides within groove **91***c* during the rotation of cam gear **91**. With the leading end of pin **96** sliding within groove **91***c*, force that causes axial movement of cam gear **91** is applied to cam gear **91**, whereby cam gear **91** moves (reciprocates) axially (vertically in FIG. **4**) relative to head mount **94**. In the present exemplary embodiment, cam gear **91** moves in a first axial direction that is an axial direction toward head **100** and in a second axial direction opposite to the first axial direction.

When the torque is transmitted to brush part **110** by cam gear **91**, which is the first transmission mechanism, with head **100** mounted to main body **10**, brush part **110** moves along an axis of rotation (vertically in FIG. **4**) while rotating about rotation center C.

When the torque is transmitted to brush part **110** by ring gear **93**, which is the second transmission mechanism, with head **100** mounted to main body **10**, brush part **110** rotates about rotation center C.

A description is provided next of a structure of head **100**. FIGS. **8** to **10** illustrate head **100** having brush part **110** to which the torque is transmitted by ring gear **93**, which is the second transmission mechanism.

Head **100** includes brush part **110** and substantially cylindrical head case **120** that is formed with opening **121** for passage of the foam (cleanser) and disposed to surround brush part **110**.

In the present exemplary embodiment, brush part **110** is rotatably and movably supported by head case **120**.

Specifically, head case **120** is formed with, as shown in FIG. **10**, groove **122** in its inner peripheral surface. This groove **122** receives engagement part **116***a* of brush part **110**, so that brush part **110** supported by head case **120** is capable of the rotation and the movement (reciprocation along the axis of rotation) with respect to head case **120**.

The inner peripheral surface of head case **120** is also formed with a plurality of recesses (not shown) for engagement with the respective plurality of projections **94***a* of head mount **94**. Through the engagement of these recesses (not shown) with respective projections **94***a*, head case **120** is mounted to head mount **94**. It is to be noted that head mount **94** is fixed to housing **11** in a non-rotatable manner, and head case **120** is mounted to head mount **94** in a non-rotatable manner. Thus, head case **120** is non-rotatably mounted to main body **10** when head **100** is mounted to main body **10**.

Within groove **122**, first restricting part **122***a* and a plurality of second restricting parts **122***b* are formed. First restricting part **122***a* restricts excessive projection of brush part **110** from head case **120**, while the plurality of second restricting parts **122***b* restricts disengagement of brush part **110** from head case **120**. The plurality of second restricting parts **122***b* formed is positioned opposite to first restricting part **122***a* in the present exemplary embodiment and can be, for example, equi-spaced on the inner peripheral surface of head case **120**.

With first restricting part **122***a* and second restricting parts **122***b* thus formed within groove **122**, brush part **110** supported by head case **120** is capable of reciprocation within a predetermined range along the axis of rotation.

Head **100** further includes elastic member **130** disposed between engagement part **116***a* and first restricting part **122***a* for urging brush part **110** in a direction away from opening **121**. As an example of this elastic member **130**, a coil spring can be used. It is to be noted that elastic member **130** can be omitted.

Brush part **110** is driven (to at least rotate relatively to main body **10**) by the driving force of drive source **14** with head **100** mounted to main body **10**. This brush part **110** includes first brushes **111** and second brushes **112**.

Brush part **110** further includes base **113** that is formed with discharge hole (hole) **114** for passage of the foam (cleanser), and this base **113** is formed with first brushes **111** and second brushes **112** on its surface having release port **114***a*. Discharge hole **114** can be formed, for example, in a center of base **113**. With discharge hole **114** formed in the center of base **113**, the foam fed from discharge hole **114** to the surface of base **113** is evenly fed to respective portions of the surface of base **113**.

In the present exemplary embodiment, base **113** is divided into first brush base mount **116** and second brush base mount **117**, and second brush base mount **117** is formed with holes **118** for allowing second brushes **112** to pass through.

First brush base mount **116** is formed with, on its outer periphery, above-mentioned engagement part **116***a* that is engaged in groove **122**. First brush base mount **116** is also formed with a plurality of hooks **116***b* for contact with the plurality of hooks **93***a* of ring gear **93**.

Moreover, as shown in FIG. **8**, first brush base mount **116** is formed with a plurality of recesses **116***c*, and first brushes **111** are implanted in respective recesses **116***c*, thereby being supported by base **113**.

On the other hand, second brushes **112** are formed on base mounts **115**. Each of base mounts **115** is held between first brush base mount **116** and second brush base mount **117**, whereby second brushes **112** are supported by base **113** via base mounts **115**.

When head **100** having such a structure is mounted to main body **10**, the recesses (not shown) formed in the inner peripheral surface of head case **120** are brought into engagement with respective projections **94***a* of head mount **94**, whereby head case **120** is mounted to head mount **94**. Accordingly, hooks **116***b* formed on first brush base mount **116** come into contact with hooks **93***a* formed on ring gear **93**, whereby ring gear **93** is permitted to transmit the torque to brush part **110**.

Here, discharge hole (hole) **114** formed in brush part **110** communicates with space **83***a* of container **83** via the respective spaces within the components including cam gear **91**.

Accordingly, when drive source **14** is driven with head **100** mounted to main body **10**, brush part **110** rotates relatively to head case **120** (main body **10**), while the foam (cleanser) generated by foam generating mechanism **80** is released from discharge hole **114**. In the present exemplary

embodiment, to enable the passage of the foam (cleanser), brush part **110** is formed with discharge hole (hole) **114**. As described above, also inlet **18** communicates with space **83***a*, so that communication is established between inlet **18** and discharge hole **114** when head **100** is mounted to main body **10**.

As described above, brush part **100** includes first brushes **111** and second brushes **112** in the present exemplary embodiment, and first brushes **111** each have tuft **111***b* of a plurality of bristles **111***c*, while second brushes **112** are each thicker than each of bristles **111***c*.

It is preferable that first brushes **111** are made of soft material, while second brushes **112** are made of material harder than the material used for first brushes **111**.

In the present exemplary embodiment, tuft **111***b* having the plurality of bristles **111***c* is formed and implanted in recess **116***c* formed in first brush base mount **116**, thus forming first brush **111** (refer to FIG. **14**).

Second brushes **112** are made of silicon, the material harder than the material used for first brushes **111**. In the present exemplary embodiment, a comparison of the thickness of first brush **111** is made with the thickness of second brush **112**, using each of bristles **111***c* and each of second brushes **112** made of silicon. FIG. **8** illustrates tuft **111***b* that is thicker than second brush **112** and is implanted in recess **116***c*. However, tuft **111***b* can be made thinner than second brush **112**.

In the present exemplary embodiment, second brushes **112** disposed around rotation center C of brush part **110** are made greater in number than second brushes **112** disposed along outer circumference **110***a* of brush part **110**.

Specifically, second brushes **112** are disposed on a plurality of concentric circles that have a center at rotation center C of brush part **110**.

When a comparison is made of numbers of second brushes **112** disposed on two radially adjacent concentric circles among the plurality of concentric circles, the number of second brushes **112** disposed on the concentric circle closer to rotation center C of brush part **110** is made not less than the number of second brushes **112** disposed on the outer concentric circle.

When viewed along a rotation center axis (from a plane of brush part **110**), the brushes (first brushes **111** and second brushes **112**) are disposed in a region of brush part **110** that is divided into regions R**1** where first brushes **111** are disposed and regions R**2** where second brushes **112** are disposed.

Specifically, as shown in FIG. **8**, the region of brush part **110** where the brushes (first brushes **111** and second brushes **112**) are disposed has four regions R**1** where first brushes **111** are disposed and four regions R**2** where second brushes **112** are disposed.

In addition, regions R**1** where first brushes **111** are disposed and regions R**2** where second brushes **112** are disposed are present in a circumferentially alternating manner.

The present exemplary embodiment has the plurality of circumferentially formed regions R**2** where second brushes **112** are disposed.

In each of four regions R**2** where second brushes **112** are disposed, a row of one brush **112**, a row of two brushes **112** a row of three brushes **112**, and a row of four brushes **112** are formed in this order from outer circumference **110***a* to an inner circumference of brush part **110**.

This means that when a comparison is made of numbers of second brushes **112** disposed on the two radially adjacent concentric circles even in each of regions R**2**, the number of second brushes **112** disposed on the concentric circle closer to rotation center C of brush part **110** is not less than the number of second brushes **112** disposed on the outer concentric circle.

Accordingly, four regions R**2** where second brushes **112** are disposed are arranged in a substantially radial pattern. Moreover, in the present exemplary embodiment, these four regions R**2** for second brushes **112** are arranged to be substantially symmetrical (with respect to rotation center C and a straight line passing through rotation center C).

Even on the innermost side (the closest concentric circle to rotation center C), regions R**1** where first brushes **111** are disposed and regions R**2** where second brushes **112** are disposed are present in a circumferentially alternating manner.

Even on the outermost side (the furthest concentric circle from rotation center C), regions R**1** where first brushes **111** are disposed and regions R**2** where second brushes **112** are disposed are present in a circumferentially alternating manner.

In the present exemplary embodiment, the region of brush part **110** where the brushes (first brushes **111** and second brushes **112**) are disposed in brush part **110** has substantially trapezoidal regions R**1** and substantially triangular regions R**2**.

Here, an area of region R**2** (a total area of four regions R**2** in the present exemplary embodiment) where second brushes **112** are disposed is preferably not more than a half of an area of region R**1** (a total area of four regions R**1** in the present exemplary embodiment) where first brushes **111** are disposed.

To allow second brushes **112** to exhibit its cleaning power, the area of region R**2** is preferably not less than 20 percent of the area of region R**1**.

Furthermore, in the present exemplary embodiment, leading ends **111***a* of first brushes **111** project further than leading ends **112***a* of second brushes **112**.

In other words, when brush part **110** is brought into contact with the skin, first brushes **111** contact the skin earlier than second brushes **112**.

It is to be noted that a distance from leading ends **111***a* of first brushes **111** to leading ends **112***a* of second brushes **112** can be, for example, about 3 mm.

Beauty apparatus **1** having such a structure can be used to remove dirt from skin by a method such as follows.

First, head **100** is mounted to main body **10**. Next, lid **17** is opened, a predetermined amount of the foaming agent is poured into space **83***a* from inlet **18**, and a predetermined amount of the water is poured into space **83***a* from at least one of inlet **18** and discharge hole **114**.

With lid **17** being closed, the brushes (first brushes **111** and second brushes **112**) of brush part **110** are abutted on a skin surface.

In this state, first operation unit **21** is operated to change drive source **14** from OFF to ON.

Drive source **14** is driven accordingly, and in association with this, the driving force is transmitted to foam generating mechanism **80** and brush part **110**. By being driven, foam generating mechanism **80** generates foam (from the cleanser), and the foam is fed through discharge hole **114** to the surface of base **113**. This results in such a state that the foam is present between the brushes (first brushes **111** and second brushes **112**) of brush part **110** and the skin.

By being driven, brush part **110** rotates relatively to head case **120** (main body **10**), when the dirt is removed from the skin by the rotating brushes (first brushes **111** and second brushes **112**).

Specifically, with thick second brushes **112** abutted on the skin surface while being rotated, dead skin cells that are hard to remove with normal brushes are removed, while the dirt is removed from the skin surface by the brushes (first brushes **111**) having thinner bristles **111***c*.

In cases where thorough removal of makeup or the like that is put on skin is desired, a method such as follows can be used.

First, head **100** is mounted to main body **10**. Next, lid **17** is opened, a predetermined amount of the foaming agent is poured into space **83***a* from inlet **18**, and a predetermined amount of the water is poured into space **83***a* from at least one of inlet **18** and discharge hole **114**.

Thereafter, second operation unit **22** is operated to change warming mechanism **30** from OFF to ON. Warming surface **36** heated by heater **31** is abutted on the skin for warming the skin. Prewarming the skin in this way facilitates the removal of, for example, the makeup put on the skin.

After the skin is warmed by warming mechanism **30** for a certain time, second operation unit **22** is operated to change warming mechanism **30** from ON to OFF.

With the brushes (first brushes **111** and second brushes **112**) of brush part **110** abutted on a skin surface, first operation unit **21** is operated to change drive source **14** from OFF to ON, thus driving foam generating mechanism **80** and brush part **110**.

The foam generated is fed to the surface of base **113** while the brushes (first brushes **111** and second brushes **112**) are rotated, thereby removing dirt from the skin.

To cause brush part **110** to rotate on rotation center C and move along the axis of rotation (vertically in FIG. **4**) with head **100** mounted to main body **10**, cam gear **91**, which is the first transmission mechanism, only have to transmit the torque to brush part **110**.

This means that brush part **110** only have to be formed with, in place of hooks **116***b*, hooks that are brought into contact with hooks **91***d* of cam gear **91** when head **100** is mounted to main body **10**.

In this way, associated with the rotation of cam gear **91**, brush **110** rotates.

As cam gear **91** moves in the first axial direction, brush part **110** is pressed and moves in a direction away from main body **10**, that is to say, in the first axial direction.

On the other hand, when cam gear **91** moves in the second axial direction, at least one of gravity acting on brush part **110** and reaction force of elastic member **130** disposed on head **100** causes brush part **110** to move in a direction toward main body **10**, that is to say, in the second axial direction.

The torque transmitted to brush part **110** by cam gear **91** with head **100** mounted to main body **10** can cause brush part **110** to rotate and move axially (reciprocate: oscillate) relatively to head case **120** (main body **10**). In this case, the dirt is removed from the skin through the rotation and the oscillation of brush part **110**.

As described above, beauty apparatus **1** according to the present exemplary embodiment includes main body **10** including grip **10***a*, and brush part **110** rotatably mounted to main body **10**.

Brush part **110** includes first brushes **111** each having tuft **111***b* having the plurality of bristles **111***c*, and second brushes **112** each of which is thicker than each of the plurality of bristles **111***c*.

In addition, second brushes **112** disposed around rotation center C of brush part **110** are greater in number than second brushes **112** disposed along outer circumference **110***a* of brush part **110**.

Accordingly, difference in skin cleaning power is reduced between a side of rotation center C and a side of outer circumference **110***a* of brush part **110** when brush part **110** is rotated with the brushes (first brushes **111** and second brushes **112**) abutted on the skin surface for skin cleaning. Consequently, more uniform removal of the dirt from the skin can be achieved.

By being abutted on the skin surface while being rotated, thick second brushes **112** can remove the dead skin cells that are hard to remove with the normal brushes, while the brushes (first brushes **111**) having thinner bristles **111***c* can remove the dirt from the skin surface. Here, the dead skin cells can be removed more efficiently even near rotation center C where peripheral velocity is low, so that the dirt can be removed more uniformly from the skin.

Second brushes **112** are disposed on the concentric circles that have a center at rotation center C of brush part **110**.

When the numbers of second brushes **112** disposed on the radially adjacent concentric circles are compared, the number of second brushes **112** disposed on the concentric circle closer to rotation center C of brush part **110** is not less than the number of second brushes **112** disposed on the outer concentric circle.

Accordingly, the difference in skin cleaning power can be reduced further between the side of rotation center C and the side of outer circumference **110***a* of brush part **110**, thereby enabling more uniform removal of the dirt from the skin.

Second brushes **112** are higher in hardness than first brushes **111**.

This enables more reliable removal of the dead skin cells that are hard to remove with the normal brushes.

Second brushes **112** are made of silicon.

Second brushes **112** made of silicon can thus remove the dead skin cells adhering to the skin surface by rubbing the skin with reduced skin irritation.

Leading ends **111***a* of first brushes **111** project further than leading ends **112***a* of second brushes **112**.

In this way, second brushes **112** are prevented from abutting strongly on the skin, thereby reducing skin irritation.

When viewed along the rotation center axis, brush part **110** is divided into regions R**1** where first brushes **111** are disposed and regions R**2** where second brushes **112** are disposed.

With second brushes **112** disposed in the predetermined regions, skin cleaning power can be increased as compared with cases where second brushes **112** are disposed dispersively.

The plurality of regions R**2** where second brushes **112** are disposed is formed circumferentially.

Accordingly, when brush part **110** is rotated with the brushes (first brushes **111** and second brushes **112**) abutted on the skin surface for skin cleaning, first brushes **111** and second brushes **112** alternate in cleaning a predetermined part of the skin, whereby the skin cleaning power can be increased further with reduced skin irritation.

The area of region R**2** where second brushes **112** are disposed is not more than the half of the area of region R**1** where first brushes **111** are disposed.

With the area of region R**2** where second brushes **112** are disposed being not more than the half of the area of region R**1** where first brushes **111** are disposed, more reliable reduction of the skin irritation can be achieved.

Brush part **110** is formed with discharge hole (hole) **114** that enables the passage of the foam (cleanser).

The foam (cleanser) such as present inside main body **10** can be fed to first brushes **111** and second brushes **112** during skin cleaning, thereby increasing the skin cleaning power more

In the present exemplary embodiment, foam generating mechanism **80** and brush part **110** are both driven by drive source **14**. For this reason, beauty apparatus **1** can be reduced in size and manufacturing cost as compared with cases where foam generating mechanism **80** and brush part **110** are driven by separate drive sources.

In the present exemplary embodiment, warming mechanism **30** is not driven while drive source **14** is driven. In this way, power saving is enabled because the supply of power to warming mechanism **30** can be disabled when warming mechanism **30** is not in use while foam generating mechanism **80** and brush part **110** are in use for skin cleaning.

In the present exemplary embodiment, drive source **14** is not driven while warming mechanism **30** is driven. In this way, power saving is enabled because the supply of power to drive source **14** can be disabled when foam generating mechanism **80** and brush part **110** are not in use while warming mechanism **30** is used to warm the skin. Moreover, brush part **110** that is not turned toward the skin can be prevented from discharging the foam.

The preferred exemplary embodiment of the present disclosure has been described above; however, the present disclosure is not limited by the above exemplary embodiment and enables various modifications.

For example, controller **16** is not limited to the controls shown in the above exemplary embodiment and can perform various controls.

Drive source **14** can be mounted to head **100**.

In the above exemplary embodiment, the driving force of drive source **14** is transmitted to foam generating mechanism **80** via first transmission block **50**, and then to second transmission block **90**. This means that with head **100** mounted to main body **10**, foam generating mechanism **80** and head **100** are both driven by the driving force of drive source **14**. However, foam generating mechanism **80** and brush part **110** can be driven independently by the separate drive sources. Here, those drive sources can be mounted inside main body **10**, or alternatively, at least one of those drive sources can be mounted to head **100**.

Main body **10** can have inlet **18** omitted. In this case, the foaming agent can be poured into space **83***a* from, for example, discharge hole **114**. Because main body **10** is not formed with inlet **18**, lid **17** can be omitted.

Main body **10** can be formed integrally with head **100**. In other words, a structure such that head **100** cannot be detached from head mount **94** can be used. Here, either the first transmission mechanism or the second transmission mechanism can be omitted from the structure.

Housing **11** can be formed with warming surface **36** on its front or back surface.

Foam generating mechanism **80** can be omitted from the beauty apparatus. In this case, without a supply of the foam (cleanser) or with the foam (cleanser) provided to the skin by the user or another means, the beauty apparatus can remove the dirt from the skin.

The main body, the brush part and other details can also have their specifications (such as shape, size and layout) modified.

Beauty apparatus **1** according to the above exemplary embodiment and beauty apparatuses according to the above modifications can each be used as a part of a beauty apparatus set.

The beauty apparatus set includes, for example, main body **10**, head **100**, and second head **200** illustrated by FIGS. **11** to **13**, and head **100** or second head **200** can be mounted to main body **10** for use according to purpose.

Second head **200** illustrated by FIGS. **11** to **13** expedites removal of dirt from a target part (such as facial skin) through rubbing of the target part with brushes **211** that are fed with the foam (cleanser).

This second head **200** includes brush part **210** and substantially cylindrical head case **220** that is formed with opening **221** for passage of the foam (cleanser) and disposed to surround brush part **210**.

Brush part **210** is rotatably and movably supported by head case **220**.

Specifically, head case **220** is formed with, as shown in FIG. **13**, groove **222** in its inner peripheral surface. This groove **222** receives engagement part **213***a* of brush part **210**, so that brush part **210** supported by head case **220** is capable of the rotation and the movement (reciprocation along an axis of rotation) with respect to head case **220**.

The inner peripheral surface of head case **220** is also formed with a plurality of recesses (not shown) for engagement with the respective plurality of projections **94***a* of head mount **94**. Through the engagement of these recesses (not shown) with projections **94***a*, head case **220** is mounted to head mount **94**. It is to be noted that head mount **94** is fixed to housing **11** in a non-rotatable manner, and head case **220** is mounted to head mount **94** in a non-rotatable manner. Thus, head case **220** is non-rotatably mounted to main body **10** when second head **200** is mounted to main body **10**.

Within groove **222**, first restricting part **222***a* and a plurality of second restricting parts **222***b* are formed. First restricting part **222***a* restricts excessive projection of brush part **210** from head case **220**, while the plurality of second restricting parts **222***b* restricts disengagement of brush part **210** from head case **220**. The plurality of second restricting parts **222***b* is positioned opposite to first restricting part **222***a* and can be, for example, equi-spaced on the inner peripheral surface of head case **220**.

With first restricting part **222***a* and second restricting parts **222***b* thus formed within groove **222**, brush part **210** supported by head case **220** is capable of reciprocation within a predetermined range along the axis of rotation.

Second head **200** further includes elastic member **230** disposed between engagement part **213***a* and first restricting part **222***a* for urging brush part **210** in a direction away from opening **221**. As an example of this elastic member **230**, a coil spring can be used. It is to be noted that elastic member **230** can be omitted.

Brush part **210** is driven (to at least rotate relatively to main body **10**) by the driving force of drive source **14** with second head **200** mounted to main body **10** and has brushes **211** of the same type provided to base **213**.

Base **213** is formed with, in its center, discharge hole (hole) **214** for passage of the foam (cleanser), and brushes **211** are formed on a surface of base **213** that has release port **214***a*.

Base **213** is formed with, on its outer periphery, engagement part **213***a* for engagement in groove **222** and is also formed with a plurality of hooks **213***b* for contact with the plurality of hooks **93***a* of ring gear **93**.

Moreover, as shown in FIG. **11**, base **213** is formed with a plurality of recesses **213***c*, and brushes **211** are implanted in respective recesses **213***c*, thereby being supported by base **213**.

It is preferable that brushes **211** are made of soft material. Accordingly, tuft **211***b* of a plurality of bristles is formed and

implanted in each recess **213***c* formed in base **213**, thus forming brush **211** of second head **200**.

When second head **200** having such a structure is mounted to main body **10**, the recesses (not shown) formed in the inner peripheral surface of head case **220** are brought into engagement with respective projections **94***a* of head mount **94**, whereby head case **220** is mounted to head mount **94**. Accordingly, hooks **213***b* formed on base **213** come into contact with hooks **93***a* formed on ring gear **93**, whereby ring gear **93** is permitted to transmit the torque to brush part **210**.

Here, discharge hole (hole) **214** formed in brush part **210** communicates with space **83***a* of container **83** via the respective spaces within the components including cam gear **91**.

Accordingly, when drive source **14** is driven with second head **200** mounted to main body **10**, brush part **210** rotates relatively to head case **220** (main body **10**), while the foam (cleanser) generated by foam generating mechanism **80** is released from discharge hole **214**.

Structurally, when mounted to main body **10**, this second head **200** also allows brush part **210** to rotate on rotation center C and move along the axis of rotation (vertically in FIG. **4**).

The head included in the beauty apparatus set is not limited to second head **200**. Second head **200** can be replaced by another head, or alternatively, another head in addition to second head **200** can be included in the beauty apparatus set.

An example of such another head is a head having a foam stirring mechanism supported on a head case.

As described above, beauty apparatuses according to the present disclosure are capable of more uniform removal of dirt from skin and thus can be applied as beauty apparatuses put to various uses including home use and commercial use.

What is claimed is:

1. A beauty apparatus comprising:

a main body including a grip; and

a brush part rotatably mounted to the main body and configured to rotate around a rotation center,

wherein the brush part comprises a first brush part including first brushes, each of which includes a plurality of bristles, and a second brush part including second brushes, a thickness of each of the second brushes being thicker than each of the plurality of bristles,

wherein a total number of the second brushes of the second brush part disposed around the rotation center of the brush part is greater than a total number of the second brushes of the second brush part disposed along an outer circumference of the brush part,

the second brushes of the second brush part are disposed on respective concentric circles having a center of the concentric circles at the rotation center of the brush part, and

the second brushes of the second brush part are disposed such that a total number of the second brushes disposed on one concentric circle is greater than a total number of the second brushes disposed on an adjacent concentric circles closer to the outer circumference of the brush part than the one concentric circle.

2. The beauty apparatus according to claim **1**, wherein each of the second brushes is higher in hardness than the first brushes.

3. The beauty apparatus according to claim **1**, wherein each of the second brushes is made of silicon.

4. The beauty apparatus according to claim **1**, wherein a leading end of each of the first brushes projects further than a leading end of each of the second brushes.

5. The beauty apparatus according to claim **1**, wherein when viewed along a rotation center axis, the brush part is divided into a region where the first brush part is disposed and a region where the second brush part is disposed.

6. The beauty apparatus according to claim **5**, wherein the region where the second brush part is disposed is constituted by a plurality of the regions, and the plurality of regions are formed circumferentially.

7. The beauty apparatus according to claim **5**, wherein an area of the region where the second brush part is disposed is not more than a half of an area of the region where the first brush part is disposed.

8. The beauty apparatus according to claim **1**, wherein the brush part is formed with a hole enabling passage of a cleanser.

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